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(71) Applicant *(for all designated states except US)*: **VOITH TURBO GMBH & CO. KG** [DE/DE]: Alexanderstrasse 2, 89522 Heidenheim (DE).

(72) Inventors; and

(75) Inventors / Applicants *(only for US)*: **KLEY, Markus** [DE/DE]; Dürerstrasse 7, 73479 Eilwangen (DE).

(74) Attorney: **WEITZEL & PARTNERS**; Friedenstrasse 10, 89522 Heidenheim (DE).

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P.O. BOX 239
LYNNFIELD, MA 01940
(781) 334-3123
FAX (781) 334-4445

VERIFICATION OF TRANSLATION

Title of Translated Document:

International Preliminary Examination Report dated March 16, 2006 and Modified Patent Claims for the International PCT/EP2004/014022

Original Language of Translated Document: **German**

The undersigned declares that:

1. I am a professional translator with English as a native language and German as an acquired language. With over thirty years of full-time translating experience in general, medical, technical, chemical and related fields.
2. To the best of my knowledge and belief, the attached is a true, accurate and complete English translation of the above-referenced German document

Date: May 31, 2006 Signature: A. M. Russell
A.M. Russell

PATENT COOPERATION TREATY

Handwritten: 29 months: May 22, 2006

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY **PCT**

WEITZEL, Wolfgang, Dr.
Weitzel & Partners
Patent Attorneys
Friedenstrasse 10
89522 Heidenheim
GERMANY

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(PCT Rule 71.1)
Date of Mailing: 16 March, 2006
(day/month/year)

Applicant's or representative's file reference PG06187WO	**IMPORTANT NOTIFICATION**	
International Application No. PCT/EP2004/014022	International filing date *(day/month/year)* 9 December 2004	Priority date *(day/month/year)* 22 December 2003
Applicant VOITH TURBO GMBH & CO. KG et al.		

1. **The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.**

2. **A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.**

3. **Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.**

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the International Patent Examination Authority	Authorized officer
[seal] European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Netherlands Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Van der Leeden, L [seal] European Patent Office Tel. +31 70 340-3488

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

Applicant's or representative's file reference PG 06187WO 0	**FOR FURTHER ACTION** See Form PCT/IPEA/416	
International Application No. PCT/EP2004/014022	International filing date *(day/month/year)* 9 December 2004	Priority date *(day/month/year)* 22 December 2003
International Patent Classification (IPC) or national classification and IPC F16D33/06		
Applicant VOITH TURBO GMBH & CO. KG et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the Applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the Applicant and to the International Bureau)* a total of 3 sheets, as follows:

      ☒ sheets of the description, claims, and/or drawings, which have been amended and are the basis for this report, and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets that supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. 1 and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of i> (indicate type and number of electronic medium(media), containing a sequence listing and/or a table related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the Office Action
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step, and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Statement with grounds according to Article 35(2) with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the request 12 July 2005	Date of completion of this report 16 March 2006
Name and mailing address of the International Patent Examination Authority [seal] European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Netherlands Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer J. Giráldez Sánchez [seal] European Patent Office Tel. +31 70 340-3488

Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International Reference
PCT/EP2004/014022

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on the translation from the original language into the following language, which is the language of the translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1 (b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets that have been furnished to the Receiving Office in response to an invitation under Article 14 and are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

1, 3-8	as originally filed
2, 2a	received on 12 July 2005 by fax

   Claims, No.

1-8	received on 1 February 2006 with letter of 30 January 2006

   Drawings, Sheets

1/3-3/3	as originally filed

   ☐ a sequence listing and/or any related table(s) – see Supplemental Box relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ description, pages:
   - ☐ claims, Nos.:
   - ☐ drawings, sheets/figs:
   - ☐ sequence listing *(specify)*:
   - ☐ any table(s) related to the sequence listing *(specify)*:

4. ☐ This report has been established without consideration of (some of) the amendments annexed to this report and listed below, since they have been considered to go beyond the disclosure filed for the reasons given in the opinion of the Authority, as indicated in the Supplemental Box (Rule 70.2 (c)).
   - ☐ description, pages:
   - ☐ claims, Nos.:
   - ☐ drawings, sheets/figs:
   - ☐ sequence listing *(specify)*:
   - ☐ any table(s) related to the sequence listing *(specify)*:

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International Reference
PCT/EP2004/014022

Box No. V Statement with grounds according to Article 35 (2) with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-8
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-8
	No:	Claims
Industrial applicability (IA)	Yes:	Claims:1-8
	No:	Claims:

2. Documents and explanations (Rule 70.7):

See Annex

Regarding Item V

Statement with grounds with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement

1. Reference is made to the following document:

D1: GB-A-1,424,704 (FRANCAISE DU FERODO SA), February 11, 1976 (2/11/1976)

2. Document D1, which is viewed as the closest prior art, discloses (see Figure 3) a hydrodynamic coupling, from which the subject of claim 1 is differentiated in that:
--the channels are formed in the drive shaft,
--the at least one supply channel and the at least one evacuation channel run in the axial direction in the drive shaft at least over a prespecified segment, whereby the at least one evacuation channel is disposed on a larger circumference than the at least one supply channel, and
-- from the axial end of the drive shaft, which is located at a distance from the working chamber, up to at least almost the other end of the drive shaft, the supply channel is formed in the shape of a central channel for working medium on the lengthwise axis of the drive shaft, and is enclosed by a plurality of evacuation channels, which are provided radially on the outside.

3. The subject of claim 1 is thus novel (Article 33(2) PCT).

4. The problem to be solved with the present invention can thus be viewed as making possible a better and simpler seal between the inlet and the outlet.

4.1. The solution to the problem, which has been proposed in claim 1 of the present application is based on inventive activity for the following reasons (Article 33(3) PCT):

the sealing between the channels can be designed in a particularly simple manner, since only one seal is necessary for all channels.

5. Claims 2-8 are dependent on claim 1 and thus also fulfill the requirements of the PCT relative to novelty and inventive activity.

Handwritten: Alternative claims

Patent Claims

1. A hydrodynamic coupling (1.1) with a primary impeller (1);

1.2 with a secondary impeller (2);

1.3 the primary impeller (1) and the secondary impeller (2) together form a toroidal working chamber (3);

1.4 the primary impeller (1) is disposed on a drive shaft (4) or is formed as an integral part of it;

characterized by the following feature:

1.5 at least one supply channel (5) for introducing working medium into working chamber (3) and at least one evacuation channel (6) for the simultaneous evacuation of working medium from working chamber (3) are formed in drive shaft (4), wherein the at least one supply channel (5) and the at least one evacuation channel (6) run at least over a prespecified segment in the axial direction in drive shaft (4), wherein the at least one evacuation channel (6) is disposed on a larger circumference than the at least one supply channel (5), and from the axial end (4.1) of the drive shaft (4), which is located at a distance from working chamber (3), up to at least almost the other end of the drive shaft (4), the supply channel (5) is formed in the shape of a central channel for working medium on the lengthwise axis of the drive shaft (4), and is surrounded by a plurality of evacuation channels (6), which are provided radially on the outside.

2. The hydrodynamic coupling according to claim 1, further characterized in that the evacuation channels (6) open up into the working chamber (3) in a region of the outer circumference (3.3) and the supply channel (5) opens up into the working chamber (3) in the region of an intermediate circumference (3.2), which is located near the face center between the inner circumference (3.1) and the outer circumference (3.3) of working

chamber (3), particularly in the form of a plurality of inlet openings.

3. The hydrodynamic coupling according to one of claims 1 to 2, further characterized in that the primary impeller (1) and the secondary impeller (2) are each mounted in a floating manner on a shaft (4, 7).

4. The hydrodynamic coupling according to one of claims 1 to 3, further characterized in that the primary impeller (1) can be mechanically locked against rotation, so that the hydrodynamic coupling exercises the function of a retarder in the case of the driven secondary impeller (2).

5. The hydrodynamic coupling according to claim 4, further characterized in that the at least one evacuation channel (6) opens up tangentially opposite the flow direction of the circulating flow of working medium in the case of the primary impeller (1), which is mechanically locked against rotation; and, in particular, the last section of the at least one evacuation channel (6), just before it opens up into working chamber (3) in the region of the outer circumference (3.3) of working chamber (3), is formed in primary impeller (1) in an axis-parallel manner relative to the axis of rotation of the hydrodynamic coupling.

6. The hydrodynamic coupling according to one of claims 1 to 5, further characterized in that at the end of drive shaft (4) which is located at a distance from working chamber (3), on the front side, there is disposed a module (8) with an inner channel (9) for working medium which is circular or formed as an annular gap in cross section, at least in the region of the connection to the drive shaft (4), this channel (9) being connected to supply channel (5) in a flow-conducting manner, and an outer channel (10) for working medium which surrounds the inner channel (9) for working medium and which is shaped like an annular gap in cross section, at least in the region of the connection to drive shaft (4),

this channel (10) being connected in a flow-conducting manner with the at least one evacuation channel (6) in drive shaft (4).

7. A drive train, comprising

7.1 an internal combustion engine (20);

7.2 an exhaust gas turbine (21), which is disposed in the flow of exhaust from the internal combustion engine (20);

7.3 the exhaust gas turbine (21) is connected in a driven connection with a crankshaft, which is driven by the internal combustion engine (20);

is hereby characterized in that

7.4 a hydrodynamic coupling (22) according to one of claims 1 to 6 is disposed in the driven connection between the exhaust gas turbine (21) and the crankshaft, wherein the primary impeller (1) can be driven by the exhaust gas turbine (21).

8. The drive train according to claim 7, further characterized in that the primary impeller (1) can be mechanically locked against rotation, so that the hydrodynamic coupling (22) brakes the crankshaft hydrodynamically.